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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

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INVENTOR(S)

Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Michael John	Macaluso	Somerville, NJ

Additional inventors are being named on the 1 *separately numbered sheets attached hereto*

TITLE OF THE INVENTION (500 characters max)

A system with a scalable physical layer implementation for communication over conventional electric wires delivering electricity in the wide range of voltage levels (90VAC to 20kVAC) and frequencies (40Hz to 400 Hz)

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ENCLOSED APPLICATION PARTS *(check all that apply)*

☑ Specification *Number of Pages* 2
☑ Drawing(s) *Number of Sheets* 1
☐ Application Date Sheet. See 37 CFR 1.76
☐ CD(s), Number
☐ Other (specify)

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT

☑ Applicant claims small entity status. See 37 CFR 1.27.
☑ A check or money order is enclosed to cover the filing fees.
☐ The Director is herby authorized to charge filing fees or credit any overpayment to Deposit Account Number:
☐ Payment by credit card. Form PTO-2038 is attached.

FILING FEE Amount ($): 80.00

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☐ No.
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The PTO did not receive the following listed item(s) — Drawing

Respectfully submitted,

SIGNATURE

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Date 12/23/03

REGISTRATION NO. *(if appropriate)*

Docket Number: EPL 065

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Additional Page

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Docket Number EPL 065

INVENTOR(S)/APPLICANT(S)

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Bo	Zhang	Somerville, NJ
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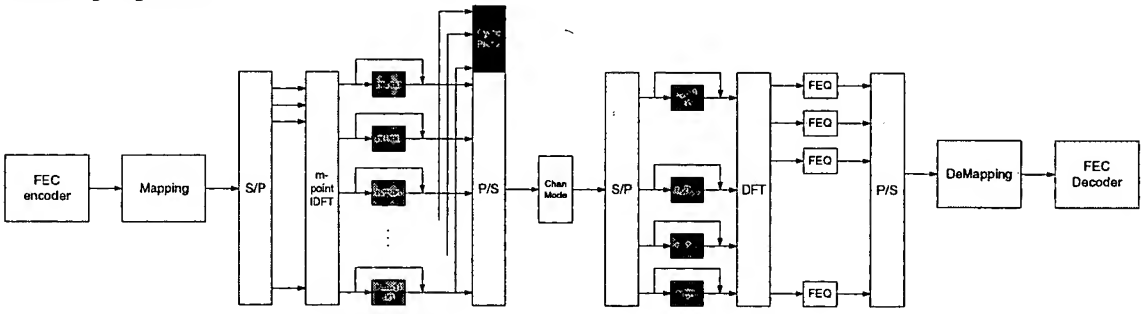
Number 2 of 2

A system with a scalable physical layer implem ntation for communication over conventional electric wir s delivering electricity in the wide range of voltage levels (90VAC to 20kVAC) and frequencies (40Hz to 400 Hz)

Inventors: Oleg Logvinov, Bo Zhang, Michael Macaluso

There exists the need to provide a robust communication over conventional electric wires. Depending on the application and/or region of the world the requirements associated with physical layer implementation may vary. In some cases a high degree of spectral containment is desirable, in other cases the ability to operate in the presence of impairments is preferable. The method described in this invention allows a cost-efficient implementation of the physical layer. The method results into a re-configurable physical layer design that allows the implementation to be configured to operate as either a wavelet based multi-carrier communication block or the same block based on classic OFDM principals.

In the preferred embodiment of the system, backwards compatibility with the well-known HomePlug 1.0 specification is achieved. The preferred embodiment illustrates the application of the method, but should not be viewed as a limiting factor to scope of the method proposed.



Note2: Red for wavelet only; Blue for FFT only; Yellow used for both
Note1: To backward compatible, M=1536/576 points FFT @ 75MHz
Note2: To backward compatible, FEC=TPC + Reed Solomon Codes + Convolutional Codes
Note3: Prefer Reed Solomon Codes + Trellis Codes
Note4: For large scale environment, bypass h(k), add cyclic Prefix (or each symbol;
For small scale environment, without cyclic Prefix, go through h(k)

The system operates in two modes. One mode, is a wavelet-like filtered-band OFDM or FFT OFDM. This mode is ideal where there is a small environment or light multi-path environment such as smaller homes in Japan or Korea. In this mode, the system works in the wavelet-like mode, which can yield highest throughput by omitting the cyclic prefix. Studies find that filtered-band OFDM only has ability of handling multi-path of about 10% of the symbol length. The second mode, for large-scale environments, or in environments where the impulse response length is longer than 10% of symbol's length, the system will insert the cyclic prefix at the beginning of the symbol. In this mode, the system runs in a traditional FFT-based OFDM mode, bypassing the wavelet filter.

Claims:

1. A method of a cost-efficient physical layer implementation that combines both wavelet and classic OFDM-based communication over conventional electric wires operating at various voltage and frequency levels.
2. A method in claim 1 that further provides a compatibility with a well-known HomePlug 1.0 specification.
3. A method of intelligent mode of operation selection based on the dynamic channel analysis.
4. A method of mode of operation selection based on the region profile.
5. A method of mode of operation selection based on the application profile.
6. A method of a symbol-size selection based on the connection-oriented profile. This approach allows an improved efficiency in channel utilization by selecting small (therefore shorter) symbols in tolerable channel conditions for small payloads such as voice codec packets.
7. A system that implements the above methods.
8. An SoC that provides an implementation of the above where configuration and control are achieved under software control.